

## *Posttraumatic growth in patients after myocardial infarction: the role of cognitive coping and experience of life threat*

### BACKGROUND

Posttraumatic growth is described as a process of restructuring of experience and positive changes in life attitudes. According to theoretical postulates, posttraumatic growth is a result of adaptive coping strategies that have cognitive character.

The aim of the study was to evaluate relationships between posttraumatic growth, cognitive coping strategies and the severity of life threat experience in a group of patients who had experienced myocardial infarction.

### PARTICIPANTS AND PROCEDURE

Fifty-three patients who had experienced their first myocardial infarction (32 men and 21 women) participated in the study and completed questionnaires measuring posttraumatic growth and cognitive coping strategies as well as a rating scale measuring the severity of life threat experience during the infarction.

### RESULTS

The results indicate that posttraumatic growth in general and in the aspect of changes in self, relationships or affirmation of life was related to cognitive coping strategies. In the case of spiritual changes, severity of life threat experience was significant while coping was not. Patients' gender, age or post-myocardial infarction time appeared to be non-significant.

### CONCLUSIONS

Generally, theories postulating that posttraumatic growth is a result of cognitive coping strategies found some support. Moreover, it may be concluded that posttraumatic growth appears only in some percentage of persons experiencing a specific trauma of myocardial infarction.

### KEY WORDS

posttraumatic growth; coping; myocardial infarction

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Authors' contribution – A: Study design · B: Data collection · C: Statistical analysis · D: Data interpretation · E: Manuscript preparation · F: Literature search · G: Funds collection

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## BACKGROUND

There is growing evidence in psychological research that experience of trauma or serious loss can eventually turn into some benefit as a result of a process of restructuring of experience and positive changes in life attitudes called posttraumatic growth (Calhoun & Tedeschi, 2006; Tedeschi & Calhoun, 1996). This specific process includes changes in the sense of self and relationships as well as existential and spiritual growth. While the process of posttraumatic growth is not observed in each person exposed to trauma or serious loss, or even not in the majority of cases, it is still characteristic for a stable minority of those who suffer (Calhoun & Tedeschi, 2006). The process has important practical implications for clinical psychologists working with clients struggling with loss. Posttraumatic growth appears to be an important aspect of readjustment and quality of life after trauma although Tedeschi and Calhoun (2004) concluded that it is not necessarily associated with an increase in well being and decrease in negative feelings. They suggest that it is possible to experience positive change and at the same time discomfort and intrusive thinking about the event. The results of a study of patients after myocardial infarction (Ogińska-Bulik, 2014a) showed weak correlations between life satisfaction and posttraumatic growth. A study of a group of cardiac patients after surgery showed no relationship between posttraumatic stress disorder (PTSD) symptoms and posttraumatic growth general score while there were some relationships with posttraumatic growth subscales, namely Change in relationships, Increased affirmation of life and Spiritual changes (Ogińska-Bulik & Juczyński, 2012). On the other hand, Zoellner and Maercker (2006) concluded that prospective studies showed a negative relationship between posttraumatic growth and intensity of PTSD symptoms. A study by Morril et al. (2008) indicated that persons who reported more positive changes showed a weaker relationship between traumatic stress and symptoms of depression.

According to Tedeschi and Calhoun (2004), posttraumatic growth appears in the face of a serious life crisis, traumatic event or serious loss, but not minor stressors of everyday life. Growth is a real transformation in life; moreover, it is not a coping process itself but rather an effect of such a process. Studies indicate that posttraumatic growth is related to adaptive forms of coping based on cognitive processing, such as positive reappraisal or acceptance (Helgeson, Reynolds, & Tomich, 2006). Similar conclusions were drawn from a meta-analysis by Linley and Joseph (2004) – strategies such as positive reappraisal, religious coping and acceptance were related to growth. Religious coping and positive reappraisal were also mentioned in a review by Prati and Pietrantonio (2009). Rajandram, Jenewein, McGrath and Zwahlen (2011)

found in a review of studies with cancer patients that posttraumatic growth was related to religious coping, positive reappraisal and problem-focused coping. A study of a group of medical rescue workers showed positive, moderate correlations between posttraumatic growth general score and coping strategies, namely turning to religion, self-distraction and seeking social support (Ogińska-Bulik, 2014b).

Posttraumatic growth was studied in persons exposed to traumatic events such as natural disaster (Cryder, Kilmer, Tedeschi, & Calhoun, 2006), war (Feder et al., 2008), combat (Galloway, Millikan, & Bell, 2011), terrorist attack (Park, Aldwin, Fenster, & Snyder, 2006) or sexual abuse (Borija, Callahan, & Long, 2006). Such experiences obviously meet the criteria of trauma (APA, 1994), but the growth was also studied in people facing serious medical conditions such as cancer (Cordova, Cunningham, Carlson, & Andrykowski, 2001) or cardiovascular diseases (Garnefski, Kraaij, Schoevers, & Somsen, 2008). Moreover, it was also studied in people experiencing loss of a close relative (Davis, Nolen-Heoksema, & Larson, 1998) or a child's disability (Konrad, 2006). While not being traumatic *per se*, those experiences can be described as serious stressful events associated with strong negative emotions, having the characteristics of a personal crisis. Seriousness and a strong negative impact are what all those experiences have in common and as such can initiate changes in one's personal perspective leading to growth.

The patient's personal experience of myocardial infarction is in many ways similar to a traumatic event – it is sudden and unexpected, negative and life-threatening. A person has negative somatic experiences such as pain, chest compression, breathing difficulty or palpitation, as well as feelings of extreme fear and helplessness. According to Garnefski et al. (2008), there were only a few studies on posttraumatic growth after myocardial infarction. Petrie, Buick, Weinman and Booth (1999) found that about 60% of myocardial infarction patients reported positive changes in response to illness while another study revealed that patients who reported positive changes were less likely to have another myocardial infarction (Affleck, Tennen, Croog, & Levine, 1987). According to Ogińska-Bulik (2014a), about one fourth of patients after myocardial infarction showed a high level of posttraumatic growth. Garnefski et al. (2008) found that posttraumatic growth in myocardial infarction patients is related to adaptive cognitive coping as well as to personality and psychological health. Similarly, Koriakin and Park (2011) found that coping processes such as positive reappraisal and religion are predictors of posttraumatic growth. Problem-oriented coping was shown to mediate the relationship between extraversion and growth (Sheikh, 2004).

The purpose of the study presented here was to evaluate the significance of two factors related to

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posttraumatic growth in patients after myocardial infarction, namely adaptive, cognitive coping strategies, and severity of the experience of life threat. Considering the fact that posttraumatic growth is observed only in a certain percentage of people experiencing serious life crisis or trauma (Calhoun & Tedeschi, 2006), the study was also aimed at the estimation of that proportion – answering the question about the occurrence of posttraumatic growth in a group of patients after myocardial infarction.

It was assumed, following Tedeschi and Calhoun (2004), that posttraumatic growth is the result of a person's coping processes. Considering the findings of Garnefski et al. (2008) as well as other studies mentioned above, coping strategies based on cognitive processing, such as positive reappraisal or refocusing, were taken into consideration as those forms that could be relevant to growth. While some studies showed positive relationships between posttraumatic growth and general coping strategies (Ogińska-Bulik, 2014b), one could expect that cognitive coping strategies would be even more significant for posttraumatic growth since those two processes are of cognitive nature.

The second factor considered was the severity of the experience of life threat during myocardial infarction. Posttraumatic growth is by definition related to major loss and trauma, situations when major disruption in the individual's world view is involved (Calhoun & Tedeschi, 2006). Thus it was expected that the magnitude of life threat during infarction, experienced by a person, may be significant for posttraumatic growth.

## PARTICIPANTS AND PROCEDURE

Participants were 53 patients undergoing cardiologic rehabilitation after myocardial infarction, 21 women and 32 men aged from 39 to 68 ( $M = 57.30$ ,  $SD = 7.42$ ). Men did not differ significantly in mean age from women ( $t = -1.75$ ,  $df = 51$ ,  $p = .090$ ). All participants had experienced their first myocardial infarction, which happened from 1.50 to 19 weeks previously, but in the case of more than 90% of participants that time was below 10 weeks ( $M = 5.50$  weeks). Seventy-three and fifty-eight hundredths percent of participants had secondary education, 18.87% higher and 7.55% elementary. The majority of participants (84.90%) were married, 7.55% were divorced, and 5.66% were widowed.

Posttraumatic growth was measured with the Posttraumatic Growth Inventory (PTGI) (Tedeschi & Calhoun, 1996, Polish adaptation – Ogińska-Bulik & Juczyński, 2010), a self-report scale with 21 items concerning positive changes experienced in the struggle with major life crises. While the original scale had a five-factor structure, factor analysis of the Polish version revealed four factors. The scale gives a gen-

eral score as well as scores in four subscales: Change in the sense of self (i.e. *I realized I am stronger than I thought*), Change in relationships (i.e. *I am closer to other people*), Increased affirmation of life (i.e. *I appreciate the value of my life more*) and Spiritual changes (i.e. *I better understand spiritual problems*). According to Ogińska-Bulik and Juczyński (2010), the scale has good psychometric properties, with Cronbach's  $\alpha$  of .93 for the general score and ranging from .87 to .63 for subscales (Change in the sense of self – .87, Change in relationships – .85, Increased affirmation of life – .73, Spiritual changes – .63).

Cognitive coping was measured with the Cognitive Emotion Regulation Questionnaire (CERQ) (Garnefski, Kraaij, & Spinhoven, 2001) in the Polish adaptation by Marszał-Wiśniewska and Fajkowska (2010) – a 36-item self-report measure in which participants are asked to report the ways they mentally elaborate the stressful event. Participants reported their coping strategies employed after the negative experience of myocardial infarction and in relation to it.

Nine cognitive strategies of coping or emotion regulation are measured with CERQ – Self blame, Blaming others, Acceptance, Refocus on planning, Positive refocusing, Rumination, Positive reappraisal, Putting into perspective and Catastrophizing. According to Garnefski et al. (2001), two higher level scales can be identified, Adaptive coping (Acceptance, Refocus on planning, Positive refocusing, Positive reappraisal, Putting into perspective) and Maladaptive coping (Self blame, Blaming others, Rumination and Catastrophizing). Reliability coefficients for the scales of the Polish version were moderate to satisfactory, ranging from .52 to .75, but the second order two-factor structure was not fully confirmed. Taking this into consideration as well as the need to reduce the number of variables in analyses due to sample size, the aggregated score in four positively intercorrelated scales was used as a measure of cognitive coping [Refocus on planning (i.e. *I think how to change my situation*,  $\alpha = .83$ ), Positive refocusing (i.e. *I am looking for positive sides of this case*,  $\alpha = .87$ ), Positive reappraisal (i.e. *I think that my situation has some positive aspects as well*,  $\alpha = .79$ ) and Putting into perspective (i.e. *I think about something pleasant instead of thinking about what happened*,  $\alpha = .75$ )].

In order to measure the severity of the experience of life threat during the infarction, the rating scale prepared especially for the purpose of the study was used. The patients were asked to recall and rate on a 5-point Likert type scale their feelings and somatic sensations during the episode. The participants rated the intensity of pain, chest compression, breathing difficulty, palpitations as well as feelings of life threat and helplessness. These somatic sensations and feelings can be treated as indicators of the personal experience of life threat, so the aggregated score was used

in further analyses, which showed good reliability (Cronbach's  $\alpha = .80$ ).

Patients of the Cardiac Rehabilitation Center were asked to participate in the study. The qualification criteria were age (not more than 70) and first episode of myocardial infarction. Patients were approached in their rooms, the purpose of the study was presented as well as information about anonymous participation, and then they gave informed consent. All patients of a group undergoing a program of rehabilitation at the center at the time of the study who met the criteria were approached and no one refused to participate.

The study was conducted according to ethical standards of psychological research approved by the Ethics Committee of the Institute of Psychology, Jagiellonian University.

## RESULTS

Descriptive statistics and intercorrelations of variables in the study are given in Table 1a and 1b. Lower mean values in two subscales of PTGI (Increased affirmation of life and Spiritual changes) can be attributed

to the differences in number of items for subscales. Tests of normality did not reveal any significant deviations, but in the case of two above-mentioned subscales of PTGI, that consisted of 2 or 3 items, the parameters were worse but not to the extent that would require nonparametric statistics.

Data from the study of 730 persons from 13 different groups (Ogińska-Bulik & Juczyński, 2010) were the basis for creating normative values of posttraumatic growth. The participants matched the normative group in terms of age, gender and education. According to these norms, patients' general scores in the PTGI scale were transformed into standard ten (sten) values, and the frequencies are given in Table 2.

When standardized scores are taken into consideration, it seems that in the case of 13.20% of patients participating in the study we may say that they restructured their experience and made positive changes in life attitudes to the extent that they may be identified as posttraumatic growth (sten values of 7 or 8). It should also be noted that more than 50% of patients had a score lower than the average. Generally low levels of posttraumatic growth can be attributed to the relatively short time period between the episode of infarction and participation in the study.

Table 1a

*Descriptive statistics for variables in the study (n = 53)*

Variable name	<i>M</i>	<i>SD</i>	Minimum	Maximum
Posttraumatic growth general score	47.28	21.83	0	84
Change in the sense of self	16.21	10.05	0	34
Change in relationships	18.81	8.98	0	35
Increased affirmation of life	9.62	4.43	0	15
Spiritual changes	2.74	2.82	0	9
Cognitive coping <sup>#</sup>	53.79	11.45	20	74
Severity of life threat experience	13.39	8.23	0	30

Note. <sup>#</sup>aggregated score of four subscales

Table 1b

*Correlations of variables in the study*

Variable name	1	2	3	4	5	6
1. Posttraumatic growth general score						
2. Change in the sense of self	.88**					
3. Change in relationships	.86**	.58**				
4. Increased affirmation of life	.79**	.61**	.62**			
5. Spiritual changes	.59**	.46**	.41**	.39**		
6. Cognitive coping <sup>#</sup>	.57**	.52**	.46**	.49**	.32*	
7. Severity of life threat experience	.21	.18	.08	.22	.34*	.18

Note. \* $p = .050$ , \*\* $p = .010$

<sup>#</sup>aggregated score of four subscales

Table 2

*The degree of posttraumatic growth in patients after myocardial infarction (distribution of normative scores of PTGI questionnaire – N = 53)*

Patient's score in PTGI (sten value)	Percentage of patients
1	15.10
2	1.90
3	18.90
4	24.50
5	11.30
6	15.10
7	9.40
8	3.80

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Multiple regression analyses were performed to evaluate the effect of cognitive coping and experience of life threat on posttraumatic growth. PTGI general score and scores in four subscales were subsequently regressed on the cognitive coping aggregated score, severity of life threat experience score, participant's gender and age, as well as post myocardial infarction time. Variables such as gender and age were included as those factors were found in earlier studies to be related to growth (Linley & Joseph, 2004). Moreover, they were included in regressions in a study similar to the present one by Garnefski et al. (2008) performed on a group of myocardial infarction patients. Results are given in Table 3.

Cognitive coping strategies, as measured by the aggregated score of four subscales of the Cognitive Emotion Regulation Questionnaire, were the only significant predictors of posttraumatic growth in general as well as three of its aspects – change

in the sense of self, change in relationships and increased affirmation of life. In the case of the fourth aspect – spiritual changes – the relationships were quite different. The severity of life threat during the infarction was the first significant predictor, and the second – inversely – was post-infarction time. The more life-threatening was the experience of myocardial infarction and the shorter was the time since it, the greater were the spiritual changes as part of posttraumatic growth. Three other variables taken into consideration, namely gender, age and post-infarction time, were not significant for posttraumatic growth in general nor its three other aspects.

## DISCUSSION

The study was aimed at the evaluation of the level of posttraumatic growth in a group of myocardial infarction patients and the estimation of the significance of two factors – cognitive coping and severity of life threat experience during infarction.

The conclusions of Tedeschi and Calhoun (2006) were confirmed in the present study – only in the case of about 13% of participants was the degree of posttraumatic growth more than average. It seems that, at least in the case of patients after myocardial infarction, only a few (one out of ten) are capable of making more pronounced positive changes in their life attitudes resulting in personal growth after the traumatic experience of a heart attack. It should be noted however that obtained proportions are much lower than those reported by Petrie et al. (1999), Ogińska-Bulik (2014a, 2014b) or Ogińska-Bulik and Juczyński (2012). The discrepancy between the results of the present study (pronounced growth in 13.20% of myocardial infarction patients) and other, aforementioned studies in the Polish population, based on the same normative values (pronounced growth in 25.60% of myocardial

Table 3

*Posttraumatic growth scores (general and subscales) regressed on cognitive coping aggregated score, severity of life threat experience score, participant's gender and age as well as post-myocardial infarction time (results of multiple regression analyses, method enter, df = 5, 47)*

Variables in the regression	PTGI general (β)	Change in the sense of self (β)	Change in relationships (β)	Increased affirmation of life (β)	Spiritual changes (β)
Cognitive coping	0.57****	0.52****	0.49***	0.51****	0.21
Life threat experience	0.10	0.11	–0.02	0.09	0.36**
Gender	–0.06	–0.08	–0.06	0.06	–0.09
Age	–0.06	–0.18	0.06	–0.02	0.03
Post-infarction time	0.05	0.26	0.13	0.18	–0.30*
Regression summary	$F = 5.12^{***}$ $R^2 = .35$	$F = 4.61^{**}$ $R^2 = .33$	$F = 2.89^*$ $R^2 = .24$	$F = 3.95^{**}$ $R^2 = .30$	$F = 3.44^{**}$ $R^2 = .27$

Note. \* $p = .050$ , \*\* $p = .010$ , \*\*\* $p < .001$ , \*\*\*\* $p = .0001$

infarction patients, 30.00% in cardiac surgery patients and 46.20% in medical rescue workers) needs some explanation. Medical rescue workers are a quite different group from myocardial infarction patients and probably trained in coping with trauma, so the discrepancy is understandable. Moreover, while the personal experience of myocardial infarction is stressful, this trauma is also specific in some ways, so it would not be fully justified to generalize obtained results to other traumatic experiences. Myocardial infarction patients from Ogińska-Bulik's study (2014a) reported their posttraumatic growth about 3 years after the infarction (2.81 years on average) while the patients in the present study did so after less than half a year (5.50 weeks on average), and this significant difference in time period may be responsible for observed discrepancies in the level of posttraumatic growth. It should be noted as well that the results of myocardial infarction patients from only a couple of studies in the Polish population should not be treated as definitive in terms of estimation of posttraumatic growth level.

In general, the results of the present study showing a lower level of posttraumatic growth in patients with shorter post-infarction time allow the conclusion that growth is a process developing in time and occurs more frequently in patients who are a few years after the trauma of myocardial infarction than in those who experienced it less than a year ago.

The thesis that posttraumatic growth is related to coping strategies was confirmed in the present study. We may conclude that those patients who developed cognitive coping strategies such as refocusing on planning, positive refocusing, positive reappraisal and putting into perspective after they had experienced trauma of myocardial infarction were able to experience personal growth. The results obtained are congruent with those of Garnefski et al. (2008) and Koriakin and Park (2011). Moreover, the postulates of Tedeschi and Calhoun (2004) that posttraumatic growth is a result of coping strategies were also confirmed.

The second factor taken into consideration – the severity of the experience of life threat during the myocardial infarction – appeared not to be significant for posttraumatic growth. However, in the case of one aspect of growth – spiritual changes – it was a significant predictor while cognitive coping was not. It is possible that this aspect of posttraumatic growth is specific in some way and concerns different aspects of growth. Generally, the results indicate that factors such as severity of life threat experienced during the infarction might also be relevant to some aspects of posttraumatic growth but not to growth in general. The evaluation of the significance of this factor requires further studies.

It should also be noted that variables such as gender, age or post-myocardial infarction time were not related to posttraumatic growth in general. Similar results were obtained by Garnefski et al. (2008). It

may be concluded that posttraumatic growth develops equally well in those men and women of different age who apply cognitive coping strategies after the experience of myocardial infarction. Only in the case of spiritual changes as a part of traumatic growth does it seem that post-infarction time was relevant; namely, the shorter the time from the infarction episode, the more intense were the spiritual changes reported by the patients. However, this result should be treated as tentative.

The results of the present study have some practical implications for psychologists working with cardiac patients and especially those after myocardial infarction. By enhancing and developing patients' cognitive coping strategies based on positive reappraisal, planning and putting into perspective, an increased level of posttraumatic growth may be obtained and thus better adaptation in life after the myocardial infarction episode.

The participants of the present study were a rather homogeneous group in terms of the nature and intensity of traumatic experience – myocardial infarction. Moreover, they participated in the study after a relatively short time period, about six months on average, and this makes the obtained results more significant. It should also be noted that the results support the idea of traumatic events as different life episodes that have one thing in common – sudden and severe life threat. Moreover, in the case of all such episodes the process of posttraumatic growth may be expected. It seems that experience such as myocardial infarction has a lot in common with other experiences described more fully in the literature, such as accidents, criminal assaults or combat.

Some limitations of the study should also be mentioned. The group of participants was relatively small and the study was cross sectional. The patients were asked to participate some weeks after the myocardial infarction, so their reports concerning their experience of life threat during the infarction could be biased in some way. On the other hand, some time after the myocardial infarction was proper to evaluate posttraumatic growth. It should also be mentioned that due to the relatively moderate sample size, the results of regression analyses should be treated as tentative.

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